

REMARKS

The Office Action dated April 17, 2007 has been reviewed and carefully considered. Claims 12 and 13 have been added. Claims 2, 3 and 10 have been amended. Claims 1-13 are now pending in the application, with claims 1 and 10 being the only independent claims. Reconsideration of the above-identified application, as amended and in view of the following remarks, is respectfully requested.

The Examiner has objected to the title and abstract of the invention. Each has been amended to conform to current US PTO practice. With these amendments, Applicant believes that the reason for the Examiner's objection has been overcome. Applicant respectfully requests the objections be withdrawn.

The Examiner has objected to the claims 2 and 3 for the use of the word "preferably" in the language of the claims. In the interests of furthering prosecution, Applicant has removed the word "preferably" and introduced new claims, 12 and 13, to recite, as dependent claims, the corresponding features of claims 2 and 3. With these amendments, Applicant believes that the reason for the Examiner's objection has been overcome. Applicant respectfully requests the objections be withdrawn.

The Examiner has objected to the format of claim 10. In accordance with his suggestion, (Paragraph 4 of the Office Action), claim 10 has been amended to an independent claim format. With this amendment, Applicant believes that the reason for the Examiner's objection has been overcome. Applicant respectfully requests the objection to claim 10 (and claim 11 which depends there from) be withdrawn.

Claims 1-6 and stand rejected under 35 USC 102(b) as being anticipated by Neukermans et al., U.S. Patent No. 5,629,790 (Hereinafter "Neukermans"). Claim 7 stands rejected under 35 USC 103(a) as being obvious over Neukermans. Claims 8 and 9 stand rejected under 35 USC 103(a) as being obvious over Neukermans in view of Bard et al., U.S. Patent No. 5,486,944. Claims 11 stands rejected under 35 USC 103(a) as being obvious over Neukermans in view of Conemac, U.S. Patent No. 6,226,126.

The present invention relates to a two dimensional scanner which combines a pair of torsion elements, which provide deflection about one axis; with a cantilever beam, which provides deflection about a second axis. In particular, claim 1 recites:

A two dimensional scanning device, for use in a projecting display, comprising a surface (43; 53) suspended by at least two torsion elements (49; 55) defining a torsion axis (B), and a first actuator (45, 46, 47; 60, 61) for pivoting said surface (43; 53) around said torsion axis (B), characterized by

- a cantilever beam (41; 51) having one end fixed in relation to said surface and an opposite end arranged to bend around a bending axis (A) non-parallel to said torsion axis (B),
- a reflective surface (31; 34) provided on said cantilever beam (41; 51), and
- a second actuator (48; 58) for bringing said cantilever beam to oscillate at its resonance frequency.

As described in paragraph [0029] of the published application, "the scanning device 13 comprises two one-dimensional scanners; a first, slow scanner, provided with a second, fast scanner. The first scanner is a torsion scanner, and comprises a plate-shaped area suspended from the surrounding material by two bars or springs. By actuating the plate using suitable actuator, the plate can be brought to pivot around the axis defined by

the bars. The second scanner is a cantilever scanner, and comprises a cantilever beam provided with a mirroring surface attached in one end to a substrate. By actuating the beam using a suitable actuator, the beam will **bend around an axis perpendicular to its lengthwise extension** [emphasis added], and can be brought to oscillate at its resonance frequency.” This perpendicular axis of rotation is clearly illustrated in Figs. 2-3 (and is further described in corresponding paragraph [0030] of the published application).

Neukermans teaches “a frequency-locked torsional scanner of the type having a micro machined mirror formed on a surface of a silicon wafer section supported within a larger wafer section by **a pair of opposed torsion bars**” [emphasis added] (Abstract). That is, Neukermans simply teaches combining two torsion scanners. Fig. 12a illustrates these two pairs of torsion bars (items 205 and 209) which are also described as such at col. 10, lines 12-17 of Neukermans’ specification.

Paragraph 8 of the Office Action points to Figs. 12a and 12b as teaching the features of claim 1. In particular, paragraph 8c recites “a cantilever beam ((203), (205), and (207)) having one end fixed in relation to the surface and an opposite end arranged to bend around a bending axis non-parallel to the torsion axis.” Applicant respectfully disagrees. Item 203 is a mirror and item 207 is the surface suspended by torsion elements 209. The remaining element 205 is also a “torsion bar” (col. 10, line 13) – not a cantilever beam as claimed by the present invention.

As illustrated in Figs. 2-3 of the present invention, a cantilever beam has a bending axis perpendicular to its lengthwise extension. Assuming arguendo that items 205 appearing in Fig. 12a are cantilever beams (and momentarily ignoring the fact that this assumption is clearly contradictory to Neukermans defining these to be torsion bars), the

resulting structure will not function as a two dimensional scanner. "Cantilever beams" 205 would pivot in a direction that is perpendicular to their length – about the x-axis depicted in Fig. 12a. As an initial matter, such pivoting cannot take place when item 203 is secured by two opposed 205 items as illustrated. That is, each 205 beam will prevent the rotation "caused" by the other. Further, if items 205 were somehow functional as cantilever beams, Fig. 12a now lacks any means to pivot about the y axis – contrary to Neukermans invention. Still further, the bending axis of item 205 would be parallel to the bending axis of torsion axis of items 209. This is contrary to the language of claim 1 wherein the bending axis (A) of the cantilever beam is "non-parallel to said torsion axis".

For at least the reasons stated above, Neukermans fails to teach the feature of claim 1 wherein a cantilever beam, fixed in relation to the surface suspended by at least two torsion elements defining a torsion axis, is arranged to bend around a bending axis (A) non-parallel to said torsion axis.

A claim is anticipated only if each and every element recited therein is expressly or inherently described in a single prior art reference. Neukermans cannot be said to anticipate the present invention, because Neukermans fails to disclose each and every element recited. As shown, Neukermans fails to disclose the limitation of a cantilever beam having a bending axis non-parallel to the torsion axis. Claim 10 contains a similar feature and is patentable over Neukermans for at least the same reasons.

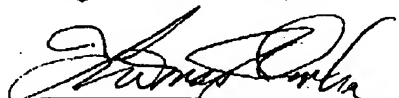
Having shown that Neukermans fails to disclose each and every element claimed, applicant submits that claims 1 and 10 are allowable over Neukermans. Applicant respectfully requests reconsideration, withdrawal of the rejection and allowance of claims 1 and 10.

With regard to claims 2-9 and 11-13, these claims ultimately depend from one of the independent claims, which have been shown to be not anticipated and allowable in view of the cited references. Accordingly, 2-9 and 11-13 are also allowable by virtue of their dependence from an allowable base claim.

For all the foregoing reasons, it is respectfully submitted that all the present claims are patentable in view of the cited references. A Notice of Allowance is respectfully requested.

Respectfully submitted,

Dan Piotrowski
Registration No. 42,079



By: Thomas J. Onka
Attorney for Applicant
Registration No. 42,053

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Mail all correspondence to:
Dan Piotrowski, Registration No. 42,079
US PHILIPS CORPORATION
P.O. Box 3001
Briarcliff Manor, NY 10510-8001
Phone: (914) 333-9624
Fax: (914) 332-0615

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Thomas J. Onka
(Name of Registered Rep.)

Thomas J. Onka 7/17/07
(Signature and Date)